

WHAT IS CLAIMED IS:

1           1.       A device for ablating tissue, comprising:  
2           an ablating device having at least one ablating element and a bottom surface,  
3 the bottom surface being positioned adjacent to tissue to be ablated; and  
4           a cover extending over the bottom surface;  
5           a cavity defined by a space between the cover and bottom surface; and  
6           a flowable material positioned in the cavity;  
7           wherein the cover is movable relative to the ablating device to a position  
8 which exposes the bottom surface while leaving the flowable material positioned between the  
9 ablating device and the tissue to be ablated.

1           2.       The device of claim 1, wherein:  
2 the ablating device has a removable tip.

1           3.       The device of claim 1, wherein:  
2 the flowable material has a boiling temperature of at least 100 degrees C and a  
3 vapor pressure higher than water.

1           4.       The device of claim 1, wherein:  
2 the flowable material is selected from the group consisting of PEG and  
3 glycerine.

1           5.       The device of claim 1, wherein:  
2 the ablating device has a plurality of ablating elements.

1           6.       The device of claim 1, wherein:  
2 the ablating device forms a closed loop.

1           7.       The device of claim 1, wherein:  
2 the cover is a sleeve which surrounds the ablating device.

1           8.       A method of ablating tissue, comprising the steps of:  
2 providing an ablating device and a cover, the ablating device having a bottom  
3 surface, the cover being spaced apart from the bottom surface to define a fluid cavity, the  
4 fluid cavity containing a fluid;

5 positioning the cover against a tissue surface;  
6 moving the cover away from the bottom surface so that the bottom surface is  
7 exposed and positioned adjacent the tissue surface, the flowable material conforming to the  
8 shape of the tissue surface and being positioned between the bottom surface of the ablating  
9 device and the tissue surface; and  
10 ablating the tissue after the moving step.

1 9. The method of claim 8, wherein:  
2 the positioning step is carried out with the tissue surface being an epicardial  
3 surface.

1 10. The method of claim 8, wherein:  
2 the moving step is carried out by moving the cover while substantially  
3 maintaining the position of the ablating device.

1 11. The method of claim 8, wherein:  
2 the providing step is carried out with the cover having a removable tip.

1 12. The method of claim 8, wherein:  
2 the providing step is carried out with the flowable material having a boiling  
3 temperature of at least 120 degrees C.

1 13. The method of claim 8, wherein:  
2 the providing step is carried out with the flowable material being selected from  
3 the group consisting of PEG and glycerine.

1 14. The method of claim 8, wherein:  
2 the providing step is carried out with the ablating device having a plurality of  
3 ablating elements.

1 15. The method of claim 8, wherein:  
2 the providing and moving steps are carried out with the ablating device  
3 forming a closed loop.

1 16. The method of claim 15, wherein:

2 the providing and moving steps are carried out with the ablating device  
3 forming a closed loop around the pulmonary veins; and  
4 the ablating step is carried out to form an ablation around the pulmonary veins.

1 17. A device for ablating tissue, comprising:  
2 a body having a first part and a second part which are coupled together to form  
3 a closed loop and separated to open the closed loop;  
4 at least one ablating element mounted to the body; and  
5 a flexible tip extending from an end of the body, the tip extending for at least  
6 two inches and being free of any ablating elements, the flexible tip facilitating advancement  
7 of the body through a space between the epicardium and pericardium.

1 18. The device of claim 17, wherein:  
2 the tip is removable from the body.

1 19. The device of claim 17, wherein:  
2 the body has a plurality of ablating elements attached thereto.

1 20. The device of claim 17, wherein:  
2 the ablating device has an ultrasonic transducer.

1 21. The device of claim 17, wherein:  
2 the body has a convex bottom surface which is positioned adjacent the tissue  
3 to be ablated.

1 22. The device of claim 21, wherein:  
2 a membrane forms the convex surface.

1 23. The device of claim 22, wherein:  
2 the membrane partially defines a cavity containing a fluid.

1 24. The device of claim 17, wherein:  
2 the ablating device has a plurality of ablating elements.

1 25. The device of claim 17, wherein:  
2 the ablating device forms a closed loop around the heart.

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1 26. A system of forming an ablation from an epicardial location,  
2 comprising the steps of:  
3 a liquid delivery device for delivering a liquid to a space between the  
4 pericardium and epicardium to create a liquid environment around the heart; and  
5 at least one ablating element for ablating tissue when submerged in the liquid  
6 environment around the heart.

1 27. The system of claim 26, wherein:  
2 the ablating element is an element selected from the group consisting of RF,  
3 ultrasound, microwave, cryo and laser

1 28. The system of claim 26, wherein:  
2 the liquid delivery device is delivered through a penetration in the  
3 pericardium.

1 29. A method of ablating tissue from an epicardial location, comprising the  
2 steps of:  
3 providing an ablating device having a tip;  
4 advancing the ablating device through a space between the epicardium and  
5 pericardium;  
6 removing the tip of the ablating device; and  
7 ablating tissue with the ablating device.

1 30. The method of claim 29, further comprising the step of:  
2 forming a closed loop with the ablating device after the removing step.

1 31. The method of claim 29, wherein:  
2 the advancing step is carried out with the ablating device having a plurality of  
3 ablating elements.

1 32. The method of claim 29, wherein:  
2 ablating step is carried out to form an ablation around the pulmonary veins.

1 33. The method of claim 29, wherein:

2 the providing step is carried out with the tip having a length of at least two  
3 inches and being free of ablating elements.

1 34. The method of claim 33, wherein:  
2 the providing step is carried out with the tip having a length of at least four  
3 inches.

1 35. A method of forming an ablation from an epicardial location,  
2 comprising the steps of:  
3 creating a liquid environment around a patient's heart;  
4 positioning an ablating device against an epicardial location of the patient's  
5 heart; and  
6 ablating tissue from the epicardial location while the ablating device is  
7 contained within the liquid environment.

1 36. The method of claim 35, wherein:  
2 the creating step is carried out by at least partially filling the pericardial space  
3 with the liquid to create the liquid environment around the patient's heart.

1 37. The method of claim 35, wherein:  
2 the ablating step is carried out with the ablating device being submerged  
3 within the liquid.

1 38. The method of claim 35, wherein:  
2 the creating step is carried out with the liquid environment being contained by  
3 the pericardium.

1 39. The method of claim 35, wherein:  
2 the ablating step is carried out with the ablating device having an ablating  
3 element which uses RF, ultrasound, laser, cold or microwave.

1 40. The method of claim 35, wherein:  
2 the creating step is carried out with the pericardium being incised to create an  
3 opening, the fluid environment having an exposed free surface of the liquid.

1 41. The method of claim 35, wherein:

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2 the creating step is carried out with the ablating device passing through a  
3 penetration in the pericardium.

1 42. A method of ablating tissue, comprising the steps of:  
2 providing an ablating device having a convex contact surface;  
3 positioning the convex contact surface adjacent to an epicardial surface;  
4 ablating the epicardial tissue after the positioning step.

1 43. The method of claim 42, wherein:  
2 the providing step is carried out with the ablating device comprising an  
3 ultrasonic transducer.

1 44. The method of claim 43, wherein:  
2 the providing step is carried out with the convex surface being formed by an  
3 element mounted to the ultrasonic transducer.

1 45. The method of claim 44, wherein:  
2 the providing step is carried out with a membrane forming the convex surface.

1 46. The method of claim 45, wherein:  
2 the providing step is carried out with the membrane partially defining a cavity  
3 containing a fluid.

1 47. The method of claim 42, wherein:  
2 the providing step is carried out with the ablating device having a plurality of  
3 ablating elements.

1 48. The method of claim 42, wherein:  
2 the providing and moving steps are carried out with the ablating device  
3 forming a closed loop around the heart.

1 49. The method of claim 48, wherein:  
2 the providing and moving steps are carried out with the ablating device  
3 forming a closed loop around the pulmonary veins; and  
4 the ablating step is carried out to form an ablation around the pulmonary veins.

1 50. An ablating device for ablating tissue, comprising:



2 the body has a contact surface on a bottom side, the contact surface being  
3 convex.

1 60. A method of ablating tissue from an epicardial location using a device  
2 according to claims 51-59.

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